

Zero Retries issue 0001 2021-07-16

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Request To Send

Nothing great has ever been accomplished without irrational exuberance. - [Tom Eyslin](#).
“Irrational Exuberance” pretty well sums up the business model of Zero Retries.

If this is the second issue of Zero Retries you’re receiving via email, you’re one of the elite few that were in on the semi-stealth launch of Zero Retries. One of the minor limitations of Substack is that you can send out a newsletter via email only once. Prior to Issue 0000, I manually added a few subscribers who I was reasonably certain would be interested in receiving Zero Retries (daughter, wife, a few friends...). I also mentioned that the launch of Zero Retries was imminent on a couple of local email lists that I’m active on. Coincidentally, I did a presentation (see below) a few hours before Issue 0000 launched, and mentioned Zero Retries in the presentation.

I was gratified to see the “launch subscribers” count creep above thirty in the hour before Zero Retries 0000 auto-launched at 15:30 PDT last Friday. Thanks folks! In the days since Zero Retries 0000, the subscriber count is steadily creeping upward. (*Update - a couple of hours before this issue auto-sends, the subscriber count stands at 81 brave souls.*) For those of you signing up for Zero Retries on the strength of [KB6NU’s](#) and [KE9V’s](#) recommendations (see below), you’re especially welcome. If you like Dan’s and Jeff’s writing and perspective, I think you’ll enjoy Zero Retries.

The launch of Zero Retries with Issue 0000 last week was, admittedly, a bit of a rush job. I just didn’t want to stall the launch of Zero Retries yet *another* week. (As my long-suffering Amateur Radio friends can attest, there have been... er... “*a lot*”... of “slips” in launching Zero Retries.) The Zero Retries “infrastructure” including the domain names (which I own) still aren’t sorted out, there’s no proper website other than the Substack landing page, some people

found their way to the old Zero Retries newsletter signup, etc. I'm not even dialed into all the many, many features of Substack, the hosting system for Zero Retries. I didn't even have a note about launching Zero Retries on my Amateur Radio blogs! (That last one is now fixed.) All that will be sorted out in the weeks to come.

One thing was obvious, that writing a draft of Zero Retries in another editor, then pouring that formatted text into Substack's editor, wasn't an optimum experience for readers. Starting with this issue, I'll be largely writing Zero Retries in Substack's editor and taking advantage of its native formatting, like block quotes. (One thing I miss in Substack's editor is an inline spell check, so apologies for any mistakes that go undetected.) Another thing I discovered is that Substack enforces a limit on length of email newsletters. That's probably a good thing.

To answer an obvious question about my writing, yes, at the moment my Amateur Radio writing is split amongst my two Amateur Radio blogs N8GNJ.org and SuperPacket.org and Zero Retries. If you want a sneak peek of what Zero Retries will be discussing in the coming months and years, just devour those two blogs, especially SuperPacket. By no means will Zero Retries be a rehash of my blog writing - there's far more in the "transmit queue" than what's made it onto those two blogs to date, but the blogs are a good primer.

In Issue 0000, I neglected to credit **Budd Churchward WB7FHC** for creating the name **Zero Retries**. Budd was a fellow member of the Northwest Amateur Packet Radio Association (NAPRA) in the 1980s. Budd came up with **Zero Retries** as the name for NAPRA's newsletter, which I was proud to edit for a time. *Apologies Budd - credit where credit is due!* I'm delighted to be back in touch with Budd as he also lives in Whatcom County and we're both active in the Mount Baker Amateur Radio Club Digital Group. Zero Retries is a cool name for a newsletter like this, and I'm glad to bring it back to life.

de N8GNJ

Amateur Radio Digital Water Holes (and Building Community)

In his review of Zero Retries Issue 0000 - [Bit Farming in Barren Land](#), (referencing [my discussion of flamp](#)) , Jeff KE9V said:

I'm going to follow Steve's lead on this one since he lives in the Pacific Northwest, an area with abundant packet activity, while I struggle to find even an APRS signal in the digital black hole that surrounds the region where I live.

Jeff's lament about his "... struggle to find even an APRS signal..." rocked me back to remember just how blessed I am to be interested in data communications via Amateur Radio and to live in Western Washington where such activity is abundant. I've been able to learn from many Amateur Radio Operators who are more experienced and much smarter than I am about Amateur Radio data modes; most recently [Scott Currie NS7C](#) and [Randy Neals W3RWN](#)) ample available information about [VARA FM](#). That I can speak eloquently and long about Amateur Radio data modes is largely because I'm able to draw from a large pool of knowledge, including personal relationships here in the Pacific Northwest.

Jeff, my collaborator-in-spirit [Steve KB9MWR](#), and many others don't have that luxury, and I feel for them. I felt that way too when I was living in Ohio in the 1980s. When I first got into Packet Radio after getting licensed in 1985, there was only one other person in the Cleveland, Ohio area (that I was aware of) that was as into Packet Radio as I was. Tom Kryza KB8CI ran the only Packet Radio Bulletin Board System (PBBS) that I could access from my home in Elyria, Ohio. Those were lonely days for Tom and I; we would get together and compare notes about what we would read in the TAPR Packet Status Register. I was *delighted beyond measure* to discover a *very* active packet radio community when I moved to the Seattle, Washington area in 1987 (the aforementioned Northwest Amateur Packet Radio Association - NAPRA). Jeff's mention reminds me to address such issues in Zero Retries, beginning with this article.

In my experience, there are four things that one can do if they want to “grow a community” of Amateur Radio data communications.

The first thing you can do to grow a community is to establish a simplex frequency (or, if you're able to do so, an FM repeater). I call this “the water hole effect” because it's critical to form a stable on-air presence with regular activity of some kind. I formed this perspective from participating in the amazing community the “WETNET Mafia” formed in the Seattle area as kind-of a successor group after NAPRA closed down. We had begun experimenting with TCP/IP over packet radio and were quickly “uninvited” from using any of the conventional packet radio frequencies from 144.91 - 145.09 MHz (TCP/IP transmissions caused havoc with, among other things, Commodore 64s and printing terminals for Amateurs that like to “monitor the channel”). We eventually settled on 147.60 MHz as our “water hole” which is an optional repeater input that was unused in Western Washington. This group eventually built [three 440 MHz, and one 144 MHz repeater systems that were purpose built for 9600 bps packet radio running TCP/IP](#). One profound effect of these repeaters is that they provided a stable reference for the (difficult, at the time) experience of assembling a 9600 bps packet radio system. (My first 9600 bps system was a 2 watt crystal controlled Tekk radio transmitting into an 11 element beam to hit the repeater with reasonable quality.) Once you could get into one of the repeaters, you had a community of like-minded souls waiting for you. It was much easier to get a radio working via a repeater instead of simplex because of the greater range and signal quality afforded by a repeater, but also because you can do a lot of self-diagnostics with a repeater by having a receiver listen to your transmissions through the repeater.

Thought experiment - use lightly used FM voice repeaters as a Digital Water Hole. I used to be a “9600 snob” and posit that *we should have 9600 bps dedicated repeaters* (like “back in the day in the Seattle area”). Over the years, that idea has met with *zero, none, nada, zilch, null, zip* interest by those who actually build and operate FM (or D-Star, or DMR) repeaters. Fortunately, Amateur Radio technology has rescued me from that lonely quest. The fldigi suite, and lately VARA FM have evolved “faster than 9600 bps” data modes that are compatible with FM repeaters. In the case of VARA FM, potentially up to 25 kbps! At a minimum, you can use an FM repeater for a scheduled net such as what's been done in the Seattle area for years. The [“Puget Sound Digital Hams Practice Net”](#) is held every Wednesday at 20:00 on the [WW7SEA repeater](#) in downtown Seattle. If you monitor the FM repeaters in your area, most of them are so lightly used these days that if you ask to try doing data over the repeater, you might be surprised to be told “OK, sure, at least the repeater is getting some use”.

A more current example is the use of 145.58 MHz as the “fsq water hole” here in Whatcom County (Bellingham), Washington. 145.58 MHz is the chosen frequency for operating with the

[fsq_mode](#) (one of the many modes in the [fldigi suite](#)). Although fsq was designed for HF use, it's remarkably robust when used on FM. Its ability to decode data despite a noisy simplex signal is why it was chosen as an effective mode for casual keyboard chat within Whatcom County even using simplex. Another factor was that it was open source, and had been implemented into a Linux version that runs well on the Raspberry Pi series of computers. When I relocated to Whatcom County two years ago, it was easy for me to just be "part of the crowd" by tuning into 145.58 and participating with the other stations that are parked on 145.58, and especially the fsq chat net every Sunday morning at 09:00.

The second thing you can do to grow a community is, as you're building up your own system, build more than one. One reason to build more than one system is for your own experimentation, but also that you can provide a loaner system to someone who's interested. I've seen so many interesting projects fail because the learning / acquisition / expense curve / construction burden is just too great for most people. Saying "all you have to do to use this is..." is just too high a hurdle for many people, *especially the younger, less experienced folks that we really need to attract into Amateur Radio!* For such a system, you might even need to include the real basics, like a twelve volt power supply, an antenna, and coax, and perhaps even a pole to get the antenna up in the air.

An example in my experimentation this summer is that I'm very impressed with the potential of VARA FM, but there's no one in my area currently using it. So, as I build a system for VARA FM, I'm actually going to build several. Once I'm satisfied it works, and I understand it, I'm going to put my VARA FM system on the air (water hole), and have the other units available to my fellow hams as loaners so that they can "plug and play" and get some experience with VARA FM. Given that I'm a writer, I'll also be developing a simple guide to operating VARA FM.

The third thing that you can do to grow a community is to make yourself available for discussion, coaching, and instruction. These are three distinct functions. Perhaps no one person has to do all of them (though it's ideal if one can), but all three distinct functions have to be present for a community to form and grow.

Discussion - Anyone new to a mode is going to have questions that they can't answer from reading, or viewing YouTube. There has to be a place where it's easy to ask questions and get knowledgeable answers. This can be an email mailing list (I recommend [groups.io](#)), a forum, a voice repeater net, or, lately (used to great effect here in Whatcom County), a Zoom channel.

Coaching / Mentoring - Coaching / Mentoring is one-on-one, and it's different from discussion, because in discussions, it's sometimes intimidating to confess that you don't know something that you're afraid is something you should know. So, the availability of coaching / mentoring is critical. (Us old hams called it Elmering. I did too until it was pointed out to me why should Amateur Radio Operators use a unique, obscure term that everyone else knows as coaching or mentoring?)

Instruction - Instruction, as in one-to-many is critical for being able to scale. Unlike discussion, instruction is structured, with a set of things "the newbies need to know" that they can be exposed to, and can later refer to, and then get help in discussion and coaching / mentoring. If you're trying to start up a new community, and get others interested in a new mode, instruction is the way to scale quickly.

Thought experiment - use video conferencing. If, like KB8CI and I in the mid-1980s in Cleveland, you don't have enough people with similar interests in your immediate (physical) community", perhaps consider a starting a weekly or monthly video conference for your county, or even state where you can compare notes with each other and encourage each other. For example, I've been very impressed with what [Radio Amateur Training Planning and Activities Committee \(RATPAC\)](#) has been able to do in the past year using video conferencing. As I understand it, RATPAC was formed as a necessity of the COVID-19 restrictions on in-person emergency communications training in 2020 and 2021, but it's been so successful it is now an ongoing activity.

The fourth thing you can do to grow a community is to Provide a Reference Website.

Ultimately you'll probably want a website so newcomers can play along and self-educate. One thing I appreciate is to be able to download documents that are written to be printed, such as composed on a word processor and then exported to PDF format for printing. Here are a few very basic suggestions on basic websites:

- Figure out a domain name and register it for five years. If possible, register it with a club so it doesn't end up stranded if an individual gets hit by a bus.
- If possible, use the "redirect domain name" feature to point the domain name to the info website rather than tightly coupling the domain name to a particular website host.
- I gently suggest not using GoDaddy's website builder options (even if you use GoDaddy as a domain registrar. I've heard many "my content is stranded on GoDaddy" stories).
- A free Gmail account includes access to Google Drive, and in Google Drive you can create a Google Doc document that can be made read-only public.
- If you use a mailing list hosted by [groups.io](#), the paid tier includes a pretty good Wiki. I've seen clubs and even businesses use the groups.io Wiki as their primary website.
- If you need one recommendation, mine is to use Wordpress.com (paid tier, so your site doesn't have spammy ads injected into it).
- Don't get fancy - text, downloadable documents, and a few photos is fine for getting others to play along with your project.

I've benefited from all of these in my Amateur Radio experience, and I've tried to provide all of the above when I've been asked. If we're going to grow Amateur Radio, and create new Amateur Radio Digital Water Holes, a lot of us have to get good at doing this. Hopefully Zero Retries can help.

Scholarships You Might Not Know About

I'm way, way late with this to be relevant for the 2021/2022 academic year, but the subject of scholarships relevant to Amateur Radio came up in a discussion I participated in. It occurred to me that perhaps some Zero Retries readers, or their children of college age, might find these potential sources of scholarships useful for future reference.

[ARRL](#) - Of course, the best-known scholarships in Amateur Radio are from the ARRL. In 2021, ARDC was able to considerably improve the dollar value of ARRL scholarships. If you've previously not bothered to apply to ARRL, you might want to reconsider doing so in 2022.

[Foundation for Amateur Radio \(FAR\)](#) - Supported in part by Quarter Century Wireless Association (QCWA).

[Marconi Society](#) - The Marconi Society is "... a primary advocate for research, partnerships, and programming in service of digital inclusion." See "Paul Baran Young Scholars Program".

[Radio Club of America \(RCA\)](#) - Radio Club of America is a membership society for the two-way radio industry, with some overlap with Amateur Radio. RCA was founded in 1909 - older than the ARRL.

In a brief web search, I was surprised at the number of wireless related organizations that provide scholarships. Being an Amateur Radio Operator applying for a scholarship offered by a wireless organization might provide an edge in one's scholarship application.

Advanced Data Modes for Amateur Radio

As mentioned previously, I recently did a [presentation on "Advanced Data Modes for Amateur Radio"](#) (YouTube - skip to 34:00) for the [San Juan County Amateur Radio Society](#). It was intended as a very cursory introduction of some of the things I'm covering here in Zero Retries and why they're relevant. From feedback after the presentation, I seem to have achieved that. Here is the text from my slides (no graphics; I'm kind of minimalist that way).

Advanced Data Modes for Amateur Radio
Presentation to San Juan County Amateur Radio Society, Friday Harbor, WA, USA
Via Zoom
SJCARS Meeting Presentation 2021-07-09, 11:30 PDT
Steve Stroh N8GNJ

Slide 2

Since I first got into Amateur Radio in 1985, it's rare that any of my radios have a microphone attached to them. Most of my radios had TNCs attached to them. Lately, it's a sound card / modem attached to a computer like a Raspberry Pi. I was into packet radio when I moved to the Seattle area in 1987 and almost immediately fell in with a bad crowd that did radical things like build repeaters that only passed 9600 bps data and use TCP/IP over the air. Eventually I began writing about packet radio, which somehow transitioned into a minor career writing about Broadband Internet Access using wireless technology (back when consumer access to the Internet was a new thing, and using wireless to do so was a radical concept).

My other very part-time activity is being a volunteer member of the Grants Advisory Committee for Amateur Radio Digital Communications (ARDC) that I've previously spoken about to SJCARS. ARDC is a philanthropic organization providing grants to Amateur Radio projects large and small.

I live in Bellingham, and like a few other "mainlanders" I enjoy coming up to Friday Harbor to attend the meetings and see some of my friends who now live in the San Juans.

Slide 3

There are a number of new data modes that are worth knowing about. I'll be talking about five of the most interesting:

- **Amateur Radio Emergency Data Network (AREDN)**
- **VARA FM**
- **New Packet Radio**
- **M17 Project**
- **GNU Radio**

Slide 4

Amateur Radio Emergency Data Network (AREDN)

- Uses firmware reload on Wi-Fi and Wireless ISP units. New capabilities of the AREDN firmware include auto-forming mesh networks and uses Amateur Radio dedicated spectrum below the 2.4 GHz band (normal Wi-Fi).
- Works similar to HamWAN, but operates on 2.3 GHz rather than 5.9 GHz and automatically forms networks if a connection to another unit can be established.
- High speed TCP/IP like a local area network - usable for video, voice, websites, email, etc. I think AREDN's highest utility is that every ham that has a Go Kit should include an AREDN system for linking up Go Kits at the same event.
- HamWAN and AREDN networks can be (carefully...) combined, such as what's being done in Whatcom County.
- More information: <https://www.arednmesh.org>

Slide 5

VARA FM

- New "software modem" mode for VHF and UHF is highly adaptive to radio conditions and can exchange data at speeds up to 25 kbps.
- Not packet radio - it's its own system; can only interoperate with other VARA FM stations.
- Requires Windows PC, a "high fidelity" audio interface, a radio with "flat audio" input / output, and for high speed operation, a paid license from the author (\$69).
- Very robust - uses Orthogonal Frequency Division Multiplexing (OFDM) techniques, speeds up and slows down depending on conditions, handshakes with other stations, incorporates forward error correction. Can probably operate well over FM voice repeaters.

- More information: <https://rosmodem.wordpress.com>

Slide 6

New Packet Radio

- Clean sheet of paper rethinking of the radios, software and networking used in Amateur Radio Packet Radio / data communications.
- Designed by a French Amateur Radio Operator for Europe's more liberal rules on 440-450 MHz, can do up to 500 Kbps. For US antiquated rules that specify "56 kbps maximum" it can be throttled to ~65 kbps.
- Despite the name, NPR has nothing in common with classic packet radio (no interoperation). NPR does not use AX.25. It's a real data radio using Ethernet and TCP/IP as its interface.
- Open source project, build the radio yourself out of parts, or order a kit of parts. Low power output, but an amplifier (intended for DMR) works reasonably well for ~20 watts output.
- More information: <https://hackaday.io/project/164092-npr-new-packet-radio> and <https://spectrum.ieee.org/geek-life/hands-on/build-a-longdistance-data-network-using-ham-radio>

Slide 7

M17 Project

- Another clean sheet of paper project to create a digital voice system similar to D-Star, DMR, Yaesu System Fusion, or APCO P25. Started by a team in Poland, but now has contributors worldwide. Entire project is open source.
- No dependencies on the proprietary DVSI codec that most systems use; the codec they will use for voice is the open source Codec 2.
- Their goal is to create an entirely open source "stack" - protocols, radios, hardware, software, repeaters, etc. Will have voice, data, and messaging capability.
- Recently received a \$250,000 grant from ARDC (via Open Research Institute) to speed development.
- More information: <https://m17project.org>

Slide 8

GNU Radio

- The ultimate method of experimentation with Software Defined Radio (SDR) is the open source software "toolkit" called GNU Radio.
- You want to experiment with Software Defined Radio? Anything you want to do is

probably already available in GNU Radio. Ideal for students and experimenters.

- Hardware supported by GNU Radio ranges from \$25 receive only units (RTL-SDR dongles) to very capable but expensive transceivers (Ettus Research). Several capable, (but low transmit power) transceivers available for < \$500.
- For those of us who are “code challenged” there’s a training wheels add-on called GNU Radio Companion graphical user interface. Drag blocks (function modules, like FM receiver) around, draw connections (lines) between them, and “compile”. Fiddle around until it works.
- More information: <https://www.gnuradio.org>

Slide 9

I’ll be experimenting with all of these this coming summer from my shop in Bellingham. If you’d like to follow along with my adventures and perspectives, I now publish a newsletter called Zero Retries. You can subscribe to it at <https://zeroretries.substack.com>. I also blog at <https://www.n8gnj.org> (my personal Amateur Radio activities) and <https://www.superpacket.org> (my “big picture” perspectives on Amateur Radio).
Contact:
Steve Stroh N8GNJ steve.stroh@gmail.com
Questions?

Zero Retries Events of Interest - 2H 2021

This is excerpted from [SuperPacket Events of Note - 2021](#). I’ll excerpt a few of the most significant events here for Zero Retries readers.

2021-07-16 thru 18 - [Glacier Waterton International Peace Park Hamfest](#) - Glacier Waterton International Peace Park and World Heritage Site, Montana USA and Alberta, Canada. I’m not aware of any specific “data” content for this event, but I mention it here because (as far as I’m aware) this event will be the first (large) regional in-person hamfest in the US since 2020. I’ve always wanted to attend this event; perhaps 2022.

2021-08-21 and 22 - [Huntsville \(AL\) Hamfest](#) - Like the event above, no data content I’m aware of, but it’s (as far as I’m aware), this is the first large regional hamfest in the Eastern US in 2021.

2021-09-10 thru 12 - [Northwest APRS Summer Gathering](#) - North Bend, WA. This event is held at a campground in a bucolic forest setting. It’s focused on digital modes (originally, APRS) and it’s about as “un-conference” as it gets. *I will be attending this event!* The Summer Gathering is jointly “sponsored” by [Northwest APRS](#) and the [Valley Camp Amateur Radio Club - WA7VC](#). If you’re a Zero Retries reader attending this event, please say Hi.

2021-09-17 thru 19 - [2021 ARRL and TAPR Digital Communications Conference \(DCC\)](#) - virtual. In my opinion, the DCC is a better event being virtual in 2020 and 2021 than it was in-person, because the barriers to “attend” are much lower for the virtual event. I think the DCC is

the best thing that TAPR does. I know... I miss meeting face-to-face too, but we need to expose more people to the amazing ideas promoted at the DCC instead of just the relative handful that have the means to travel to a DCC. At a minimum, I plan to “attend” the 2021 DCC and if things work out, I hope to be a presenter at the 2021 DCC.

2021-09-20 thru 24 - [GNU Radio Conference 2021](#) - Charlotte, VA and virtual. GNU Radio is the ultimate software defined radio toolkit. This is a full week of immersion in all things GNU Radio.

2021-10-29 thru 31 - [39th Annual AMSAT Space Symposium and Annual General Meeting](#) - Bloomington, MN. All things US Amateur Radio in space.

2021-10 (details TBD) - [AMSAT-UK Colloquium 2021](#) - It seems likely this event will take place (traditionally held in October), but no details have been released.

2021-10-15 thru 17 - [PACIFICON 2021](#) - San Ramon, CA - Like the Huntsville Hamfest, I’m not aware of any specific “data” content for this event, but I mention it here because this will be the only regional hamfest on the US West Coast in 2021. I *hope* to attend this event.

Feedback Loop

The reviews for Zero Retries Issue 0000 Are In.

[Dan Romanchik KB6NU](#):

What I liked about this issue of the newsletter is its forward-thinking approach to amateur radio. Of course, you’d expect this from someone who’s been as involved with the ARDC as Steve has been. Here’s hoping that Steve continues to think and write about the amateur radio that can be instead of only the amateur radio that we currently have.

[Jeff Davis KE9V](#):

It should also be noted that N8GNJ just launched Zero Retries, a newsletter about new generations of Amateur Radio Data Communications - beyond Packet Radio and the future of Amateur Radio. The first issue has already crossed the transom and it’s an engaging read for anyone with an eye on the future of amateur radio. It’s a no-cost subscription delivered via email and I can’t think of a single reason why any radio ham with an interest in digital communications wouldn’t subscribe today.

Thank you Dan and Jeff. I’m humbled. I enjoy your writing too!

Closing The Channel

It’s a privilege bringing Zero Retries to so many readers.

For the immediate future, Zero Retries will remain an experiment in progress. If you have ideas, please email me - steve.stroh@gmail.com. I'm especially interested in content ideas about things that you'd like to see discussed in Zero Retries. If you write to me, I may ask if I can quote you (only with your permission) in Zero Retries.

If you're enjoying Zero Retries, please tell your friends and co-conspirators. For the first "little while" of Zero Retries, I'm not going to make any major publicity pushes; I'm curious to see how word of mouth will work.

If you're ever in the most Northwest corner of Western Washington (or lower British Columbia), give a call on the Mt. Constitution (Orcas Island) 224.48 MHz repeater during the day. I'll probably be listening.

Contributors this issue:

- Curt Black WR5J - Glacier Waterton event.
- Jeff Davis KE9V - The two satellite events in October.
- Peter Dahl WA7FUS - Reference discussion about "the old days" of packet in the Seattle area.

Thanks for reading!
Steve Stroh N8GNJ
Bellingham, Washington, USA
2021-07-16
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Below is a much more complete "footer" that has evolved over 30+ issues of ZR.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, here are some pointers:

- **Ham Radio for Dummies** by Ward Silver N0AX is a great overview of Amateur Radio. N0AX is a gifted writer and HRFD is now in its [4th edition](#).
- My two favorite **YouTube** channels for a good overview of Amateur Radio are [AmateurLogic.TV](#). and [Ham Nation](#) (part of Ham Radio Crash Course). These folks just seem to have so much fun!
- [Radio Amateur Training Planning and Activities Committee \(RATPAC\)](#) offers weekly presentations on general Amateur Radio topics (Wednesdays) and emergency communications in Amateur Radio (Thursdays).
- Dan Romanchik KB6NU offers a free **No-Nonsense Study Guide** for the [Technician test](#) (PDF).

- [HamExam.org Amateur Radio Practice Exams](#) offers good **Flash Card and Practice Exams**.
- When you're ready to take an **Amateur Radio examination** (Tech, General, or Extra), W1MX - The MIT Amateur Radio Society offers [remote exams](#), free for students and youngsters. *There are apparently [many other remote exam options](#).*

Bonus - with an Amateur Radio license, you'll be [more attractive on dates](#) 😊

Closing the Channel

- In its mission to grow Amateur Radio and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything* and Bill Vodall W7NWP as *Zero Retries Instigator in Chief*.
- My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#) and [Jeff Davis KE9V](#) for continuing to spot, and write about “Zero Retries Interesting” type items, on their respective blogs, from Amateur Radio and beyond, that I don't spot on my own.
- [Southgate Amateur Radio News](#) consistently surfaces “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

If you see something interesting mentioned in Zero Retries and would like to search all the Zero Retries “Back Issues”, that's now easy - just click:

Search Zero Retries

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click:

Subscribe now

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Zero Retries is on Twitter @ZeroRetries - just click:

[Zero Retries on Twitter](#)

Please tell your friends and co-conspirators about Zero Retries - just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy; yes, you guessed it... just click:

Leave a comment

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc. I don’t use such information in any way other than seeing that most subscribers actually do read Zero Retries.

All previous issues of Zero Retries are available without restriction (no paywalls). For some background, Zero Retries 0000 was the **Introduction Issue**. Zero Retries 0026 and Zero Retries 0027 were a **2021 Year End Review** of Zero Retries.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ (He / Him)

These bits were handcrafted in beautiful Bellingham, Washington, USA

If you’d like to reuse an article in this issue, for example for club or other newsletters, just ask. Please provide credit for the content to me and any other authors.

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